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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/007,563	12/10/2001	Wen-Chiang Huang		4915

7590 09/16/2004

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EXAMINER	
ANDERSON, MATTHEW A	
ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/007,563	HUANG ET AL.	
	Examiner	Art Unit	
	Matthew A. Anderson	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 May 2004 and 22 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The amendment filed 6/22/2004 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

On page 10, line 23 "...typically less than 1000." is not supported in the original disclosure.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The originally filed specification did not contain support for the added limitation to claim 1. Namely, "...no greater than 1,000..." in line 11 of claim 1 of the amendment filed on 5/11/2004 was not supported at the time the application was filed.

4. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The originally filed specification did not contain support for the added limitation to claim 1. Namely, "...less than 1,000..." in line 11 of claim 1 of the amendment filed on 5/11/2004 was not supported at the time the application was filed.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-2, 4, 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dobson et al. (US 5,906,670).

Dobson et al. discloses a method of making quantum dots of a metal or metal compound by providing a solution in an evaporable solvent at a determined concentration of a chosen metal and forming droplets of the solution of a substantially

uniform size. The solvent can be removed. The size of the quantum dots can be controlled by the concentration of the solution and the size of the droplets. The quantum particles (i.e. quantum dots) include metals from groups II, III, IV, (see col. 2 lines 10-25 and col. 2 lines 60-65) and a element including S, P, As, Se, Te. The compounds made include sulfides, selenides, tellurides, phosphides, arsenides or antimonides (col. 2 lines 60-65). The metal precursor is dissolved into a solvent, atomized to form uniform droplets and the second precursor is brought into contact with the liquid to react and form the desired metal compound in the droplets. The volatile solvent is evaporated off (i.e. treated) (col. 3 lines 1-10) and the quantum particles are collected. Optimization of the size of the particles is suggested in col. 3 lines 10-60 especially 20-40. CdS (i.e. a sulfide) are described as the compounds made by the process. The solution had ethanol or methanol therein. (see example 1 and 2). The size obtained was less than 25 nm (nanometers) and preferably in the range from 1 to 20 nm. (col. 3 lines 15-20). Example 1 discloses the first precursor as a metal nitrate (cadmium nitrate).

Dobson does not disclose the size of the fluid droplets in terms of the clusters contained therein.

In respect to claims 1-2, 4, 6-10, it would have been obvious to one of ordinary skill in the art at the time of the present invention to produce compound semiconductor particles (e.g. CdS - a sulfide) from a first precursor with a metallic element (e.g. Cadmium nitrate) mixed with a second precursor to form a reacting fluid (e.g. ethanol with dissolved precursors) which is atomized into small droplets, treating the droplets

(evaporating the solvent) and drying and collecting the droplets because such is suggested directly by Dobson et al.

Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the size of the fluid droplets produced by the atomizer because Dobson relates the size of the quantum particles obtained to the size of the fluid droplets in col. 3 lines 10-20. Motivation is Dobson's suggestion to optimize.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dobson et al. (US 5,906,670) as applied to claim1-2,4,6-10 above, and further in view of Schumacher (DE 004111231 A1).

Dobson et al. is disclosed above.

Dobson et al. does not suggest using a vortex atomizer and/or a ultrasonic atomizer.

Schumacher discloses making nano-sized particles using a spray solution of nitrates and converting the solution into a mist using an ultrasonic atomizer.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine Dobson and Schumacher to give a process utilizing an ultrasonic atomizer because Schumacher discloses using a nitrate solution in such an atomizer to form small droplets and subsequently to form nanocrystals. Motivation for the combination is given in Dobson in col. 3 lines 55-60 in that alternative atomizers are suggested.

In respect to claim 3, it would have been obvious to one of ordinary skill in the art at the time of the present invention to atomize the solution with an ultrasonic atomizer because Schumacher suggests such a device for solution atomization in nanocrystal formation processes.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dobson et al. (US 5,906,670) as applied to claims 1-4,6-10 above, and further in view of Bhargava et al. (US 5,446,286).

Dobson et al. is disclosed above.

Dobson et al. does not suggest doping the particles.

Bhargava et al. discloses doping nanocrystalline semiconductors (II-VI) including CdS , ZnS, CdSe and ZnSe in col. 4 lines 5-15. In col. 7 lines 5-15, doping in solution is suggested.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the references of Dobson et al. and Bhargava et al. because doping of nanocrystalline CdS is suggested to be beneficial by Bhargava et al. and to achievable in a solution based method of forming the particles.

In respect to claim 5, it would have been obvious to one of ordinary skill in the art at the time of the present invention to dope the nanocrystalline particles because Bhargava et al. discloses the benefits of such doped nanocrystals in the abstract.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (571) 272-1459. The examiner can normally be reached on M-Th, 7-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAA
August 30, 2004

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER